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Original Research Article

To Determine the Need for Postoperative Antibiotics after Laparoscopic Appendicectomy in Nonperforated Appendicitis

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Abstract:

Background: One of the most prevalent acute gastrointestinal inflammatory diseases in both children and adults, appendicitis frequently necessitates surgery and hospitalization. Every year, 14,000 patients in the Netherlands have their appendices removed due to possible appendicitis. There are two main forms of acute appendicitis: basic and complicated. Suppurative or phlegmonous appendicitis (transmural inflammation, ulceration, or thrombosis) with or without extramural pus is referred to as a simple appendicitis. Complex appendicitis involves perforated appendicitis, gangrenous appendicitis (transmural inflammation with necrosis), and/or appendicitis with abscess formation (pelvic/abdominal). Complex appendicitis accounts for 25–30% of all cases. Postoperative surgical site infections (SSIs) can be prevented with the proper prophylactic antibiotic usage. There is no definitive recommendation, though, for how long to use antibiotics. Numerous randomized control trials have advised a single preoperative prophylactic dosage.

Aim: The aimed to determine the need for postoperative antibiotics after laparoscopic appendicectomy for non-perforated appendicitis.

Material and Method: This randomized control trial (RCT) was carried out in the General Surgery Department. All patients receiving an emergency open appendectomy who had been admitted with acute appendicitis were deemed eligible for this study. On a pre-made proforma, the demographic information, medical history, and specifics of the clinical examination of the patients were documented. Regular tests including complete blood counts, blood urea, serum creatinine, and other tests like abdominal ultrasounds were also carried out. The opaque envelope approach was used to randomize the groups. There were manufactured a total of 70 opaque envelopes with cards inside. A card saying Group A (the study group) was inside 35 of these envelopes, while a card mentioning Group B (the control group) was inside the remaining 35.

Results: In comparison to group B, group A had a mean age that was 28.54 + 9.62 + 8.52 years older. Right iliac fossa pain was the primary complaint of all research participants. Grade III SSIs were treated conservatively in two patients in group B and three patients in group A. The difference in the incidence of SSIs between the two groups was statistically negligible. Regarding the mean age, gender distribution, pain, fever, nausea, vomiting, McBurney's soreness, bowel sounds, total leukocyte count, ultrasonography, diagnosis, and histopathology report, there was no discernible difference between the two groups. Although group B's average hospital stay was longer than group A's, there was no statistically significant difference between the two groups.

Conclusion: To lower the risk of postoperative SSIs, a single preoperative dose of the preventive antibiotics cefotaxime and metronidazole at the time of induction is sufficient, and further postoperative doses have no statistically meaningful advantages. In order to ascertain the precise requirement for postoperative prophylactic antibiotics to lower the SSIs, additional research on a bigger scale with many other abdominal procedures are necessary.

Keywords: Laparoscopic Appendicectomy, Nonperforated Appendicitis, Prophylactic Antibiotics ands Surgical Site Infections.

Introduction

The most frequent emergency surgery performed is an appendectomy, which is performed when appendicitis is the source of acute abdominal pain. Acute appendicitis has a lifetime risk of up to 20% of the population.[1] Appendicitis cases that have not yet ruptured (NPA) and those that have (PA) are classified as clean-contaminated and contaminated, respectively. The effectiveness of preoperative prophylactic antibiotics in minimizing postoperative infection problems following appendectomy has been demonstrated in numerous trials.[2,3] Therefore, preoperative preventive antibiotics are likely provided to every patient having an appendectomy in our institution. Because the incision and peritoneal cavity are so heavily contaminated, patients with perforated appendicitis following appendectomy are always treated with a different course of postoperative therapeutic antibiotics.[4,5] Postoperative antibiotics' potential to lower infection complications in NPA is currently debatable.[6]

There are two main forms of acute appendicitis: basic and complicated. Suppurative or phlegmonous appendicitis (transmural inflammation, ulceration, or thrombosis) with or without extramural pus is referred to as a simple appendicitis. Complex appendicitis involves perforated appendicitis, gangrenous appendicitis (transmural inflammation with necrosis), and/or appendicitis with abscess formation (pelvic/abdominal).[7] Complex appendicitis accounts for 25–30% of all cases. In patients undergoing appendectomy for uncomplicated and complex appendicitis, antibiotic prophylaxis is helpful in preventing postoperative complications, whether the medication is given before, prior to, or postoperatively, according to a Cochrane Systematic review.[8,9]

Because the incision and peritoneal cavity are so heavily contaminated, patients with perforated appendicitis following appendectomy are always treated with a different course of postoperative therapeutic antibiotics. Postoperative antibiotics' potential to lessen infectious complications in NPA is currently debatable. There is no universal agreement on whether postoperative antibiotics are helpful for reducing infectious complications in NPA because the practice of providing postoperative antibiotics differs greatly around the world.[10,11]

Following appendicitis removal, the diseased condition of the vermiform appendix is a significant risk factor for postoperative surgical site infection (SSI).[12] SSIs are more common in patients with perforated or gangrenous appendicitis than in those with nonperforated appendicitis. Postoperative morbidities such pain, worry, annoyance, lengthened hospital stays, and monetary costs are primarily brought on by SSIs.[13] Surgeons have made significant, ongoing efforts to prevent sepsis in addition to medical professionals. Despite everything, postoperative wound infection continues to be a significant surgical limiting factor. A better prognosis can be expected from superficial incisional infections than from organ- or space-related SSIs, which make up 60% to 80% of all SSIs.[14] Antibiotics should be used properly to lower the risk of postoperative SSI by 40% to 60%. Guidelines for the selection of prophylactic antibiotics, delivery methods, and timing following emergency appendicectomies have been established by prospective clinical trials.[15]

The preoperatively administered antibiotics reach acceptable serum and tissue levels and are crucial in the prevention of SSIs because they are administered during the period of operation when there is the most bacterial contamination.[16] For the majority of elective general surgical operations, a single-dose antibiotic prophylaxis has been suggested; however, in practice, this recommendation is not followed, and multiple-dose regimens are still in use at many institutions.[17] In order to assess if postoperative antibiotics are necessary to reduce SSI following laparoscopic appendicitis surgery without perforation, this study was carried out.

Material and Methods

This randomized control trial (RCT) was carried out in the General Surgery Department. All patients receiving an emergency open appendectomy who had been admitted with acute appendicitis were deemed eligible for this study. On a pre-made proforma, the demographic information, medical history, and specifics of the clinical examination of the patients were documented. Regular tests including complete blood counts, blood urea, serum creatinine, and other tests like abdominal ultrasounds were also carried out. The opaque envelope approach was used to randomize the groups. There were manufactured a total of 70 opaque envelopes with cards inside. A card saying Group A (the study group) was inside 35 of these envelopes, while a card mentioning Group B (the control group) was inside the remaining 35. The patients were divided into one of the two groups based on the group that was mentioned in the envelope they randomly selected. Each patient enrolled in the trial was informed about the nature of the procedure, necessary investigations, suggested interventions, and potential negative consequences before their written and informed consent was obtained.

Inclusion Criteria

- All patients aged between 18 and 50 years of either sex presenting with uncomplicated appendicitis were considered eligible for the study.

Exclusion Criteria

- The study excluded patients with complicated appendicitis (gangrenous or perforated), additional comorbidities like diabetes, immunosuppression, cardiac, renal, or liver failure, allergies to cephalosporins, refusal to provide written consent, and those who had taken antibiotics elsewhere before enrolling.

Ceftriaxone (1g, IV) and metronidazole (500 mg) were given to all of the patients prior to surgery. By using the usual operating procedure, an open appendectomy was carried out through the right lower quadrant incision (McBurney incision). After being cleaned with regular saline, the incision was mainly closed in all patients. Patients having an intraoperative diagnosis of NPA were allocated into two groups at random after surgery. Group A patients were those who did not get any postoperative antibiotics, while group B patients were those who received ceftriaxone (1 g) and metronidazole (500 mg) up to 24 hours following surgery. All of the patient's appendices were sent for histological analysis after surgery.

Pus discharge from the incision as well as redness, pain, and edema were considered to be signs of surgical site infection (SSI). The fluid accumulated inside the peritoneal cavity, as proven by an ultrasound or CT scan, was referred to as the intra-abdominal collection. All infected wounds were treated by laying the wound open, cleaning the wound with regular saline, loosely packing the wound, and then performing secondary treatment. Demographic information, clinical complaints, admission temperature and CBC, surgery length, surgical results, postoperative antibiotics, and complications data were gathered.

Intervention

Both groups of patients had laparoscopic appendicectomy according to protocol. Both groups utilized the same tools and suture materials. Both groups adhered to fundamental surgical principles, such as ensuring appropriate hemostasis and avoiding undue tissue traction. Both groups received a single intravenous preoperative injection of 1 gm cefotaxime and 100 ml metronidazole at the time of induction of anesthesia. Group B, however, received three additional doses of the same antibiotics postoperatively at 8, 16, and 24 h from the time of the index surgery, whereas group A received no postoperative antibiotics. According to the surgeon's recommendations, intravenous fluids, analgesics, and other supportive therapies were also administered. After 48, 72, and 7 days, the surgical site was examined to search for any indications of postoperative wound infection. The Southampton scoring system (Grade 0-5) was used to track the scores at each dressing in a prepared table to determine the extent of wound infection.[18] For grades 0, 1, and 2, the healing of wounds was seen as typical. For grades 3 and 4, the level of wound infection was deemed minimal, while for grades 4 and 5, it was deemed serious.

Statistical Analysis

Statistical analysis SPSS 20 was used to analyze the pooled data. The demographic characteristics were compared using a chi-square test, infection rates were compared using Fisher’s exact test, and the mean duration of hospital stay was compared using an unpaired t-test.

Result

The demographics, detailed history, and clinical characteristics of the study patients are shown.

Table 1: Demographic, detailed history, and clinical characteristics of the study population

Findings	Group A, N=35	Group B, N=35
Mean age	28.54±9.62	28.62±8.52
Pain	35 (100%)	35 (100%)
Fever	10	11
Nausea/vomiting	22	24
Bowel sounds	35 (100%)	35 (100%)
Total leukocytecount		
6,000-11,000	14	12
>11,000	16	17
Ultrasonography, inflamed appendix, probetenderness	5	6
Diagnosis		
Acute appendicitis	27	29
Chronic appendicitis	5	1
Recurrent appendicitis	2	3
Sub-acute appendicitis	1	2
Histopathology Report		
Acute appendicitis	31	33
Chronic appendicitis	4	2

Regarding the mean age, gender distribution, pain, fever, nausea, vomiting, McBurney's soreness, bowel sounds, total leukocyte count, ultrasonography, diagnosis, and histopathology report, there was no discernible difference between the two groups.

Table 2: Summary of Southampton scoring

	Group N	Grade 0	Grade 1	Grade 2	Grade 3	Grades 4 and 5
48 h	Group A	28(84%)	5 (12%)	2 (4%)	0	0
	Group B	32(96%)	1 (2%)	1 (2%)	0	0
72 h	Group A	28(84%)	1 (2%)	4 (8%)	3 (6%)	0
	Group B	30(86%)	2 (4%)	3 (6%)	2 (4%)	0
7th day	Group A	34(98%)	1 (2%)	0	0	0
	Group B	34(98%)	1 (2%)	0	0	0

Table 2 summarizes the Southampton grading system for SSIs at 7, 48, and day 7 (SSIs). In the current study, there were no grade 4 or grade 5 SSIs among the patients. For grades 0, 1, and 2, wound healing was accepted as normal; however, patients with grade 3 were thought to have an infection at the site of the wound. At 72 hours, only 3 (6%) of the patients in group A and 2 (4%) of the patients in group B developed grade 3 SSIs, and they were both conservatively handled with daily dressing changes. Although group B's average hospital stay was longer than group A's, there was no statistically significant difference between the two groups.

Discussion

SSI following surgical intervention is a frightening hindrance that neither the patient nor the physician ever actively seek for.[19] About 15% of all nosocomial infections are SSIs, which typically arise when endogenous flora is translocated to a normally sterile location. Perioperative care, host defenses, bacterial inoculum and virulence, and intraoperative management are some of the factors that can affect the development of SSIs.[20] The risk for postoperative complications is substantially influenced by the disease process stage at the time of surgery and the use of the right preventive antibiotics. Preoperative antibiotic use has been proven to effectively lower the risk of post-appendectomy SSI in the literature.[21] The clinical advantages and disadvantages of providing postoperative antibiotics in addition to proper preoperative antibiotic prophylaxis have only been briefly examined in a few trials.[22]

Liberman et al.1995 [21] reported a high rate of wound infection (11.1%) among the patients who had received only preoperative cefoxitin compared to the patients who were given both pre-and postoperative cefoxitin (1.9%). In their third group of patients, who had just received a single dosage of preoperative cefotetan, they did not discover any infection complications. In order to prevent NPA, they advised using a single dosage of preoperative cefotetan.

Mui et al.2005 [3] conducted a randomized trial on 269 patients to define the optimum duration of prophylactic antibiotics in NPA. Between the three study groups, they did not discover any discernible differences in the rate of wound infection. They came to the conclusion that a single preoperative dose of antibiotics was sufficient to guard against postoperative infection problems. Le et al.2009 [4] compared the patients of NPA who received a single dose of preoperative antibiotics with those who were given postoperative antibiotics in addition to preoperative prophylaxis.

Recently Coakley et al.2011 [22] compared the outcomes of a large number of patients (728 subjects) treated with antibiotics before and after appendectomy with those who have received only preoperative antibiotics. They came to the conclusion that the use of postoperative antibiotics considerably enhanced morbidity due to greater rates of antibiotic-associated diarrhea and clostridium difficile infection rather than reducing infectious sequelae. Additionally, without providing any discernible clinical benefit, postoperative antibiotics considerably lengthened the hospital stay and raised the cost of care. [23]

Daskalakis et al.2014 [24] concluded that for all patients with nonperforated appendicitis, preoperative treatment is sufficient whereas the use of postoperative antibiotic treatment is not recommended. In contrast, postoperative broad-spectrum antibiotics are advised in the case of perforated appendicitis. Similarly, a systematic review by Andersen et al.2005 [9] has shown that the use of antibiotics in patients with uncomplicated appendicitis is superior to placebo in reducing postoperative complications; however, concluded that nospecific recommendations can be made regarding the duration of antibiotic use. However, because they have a rather significant risk of infective sequelae, individuals with severe appendicitis should continue receiving a complete antibiotic regimen. The therapeutic advantages and disadvantages of administering postoperative antibiotics combined with proper preoperative antibiotic prophylaxis have collectively only been shown in a small number of trials. [2]

studies conducted by Luckmann et al.1989 [25] and Anderson et al.1994 [26] reported that in contrast to perforated appendicitis, nonperforated appendicitis was related to age. The most significant sign that signals appendicitis, according to the literature, is soreness in the right iliac fossa (McBurney's tenderness) on abdominal examination, which was present in all patients in both groups.[26]

However, other factors including maintaining asepsis, using good surgical technique, and providing adequate postoperative care also significantly lower the risk of postoperative SSIs and, consequently, morbidity. Correspondingly, an RCT conducted by Mui et al.2005 [3] concluded that the single dose of perioperative antibiotic is adequate for the prevention of infective wound complications in patients undergoing surgery for uncomplicated appendicitis. They came to the conclusion that the extended administration of antibiotics was expensively inefficient and caused unneeded consequences. One dosage of a preventive antibiotic is sufficient to prevent infectious sequelae after an appendectomy for nonperforated appendicitis, according to a small number of additional studies in the literature.[27]

These patients did not have this problem. Due to the concern over getting postoperative SSIs, additional postoperative antibiotics are being utilized more frequently in surgical practice. Postoperative antibiotics cannot take the place of safe and effective surgical and aseptic procedures. Antibiotic usage is linked to higher risks of antibiotic-related side effects, antibiotic-resistant microorganisms, and healthcare costs.28,3 The advantages and disadvantages of antibiotic therapy must therefore be carefully considered. Furthermore, recent research demonstrating that prolonged antibiotic usage, even in patients with severe appendicitis, did not lessen postoperative infection complications, supports our findings. [18,29]

Conclusion

To lower the risk of postoperative SSIs, a single preoperative dose of the preventive antibiotics cefotaxime and metronidazole at the time of induction is sufficient, and further postoperative doses have no statistically meaningful advantages. These results, meanwhile, are only applicable to one procedure, laparoscopic appendicectomy. In order to ascertain the precise requirement for postoperative prophylactic antibiotics to lower the SSIs, additional research on a bigger scale with many other abdominal procedures are necessary. In order to control SSIs following appendectomy for NPA, a single dose of preoperative antibiotics (ceftriaxone and metronidazole) was sufficient. In these individuals, postoperative antibiotics did not significantly improve their clinical outcomes. Therefore, surgeons must update their use of antibiotic prophylaxis in accordance with accepted standards and evidence-based medicine.

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